PJM's Emergency Procedures and Messages

PJM Interconnection's most important priority is to keep the lights on for 65 million customers in 13 states and the District of Columbia. To prepare for and operate through potentially challenging conditions, such as intense heat or cold, or other severe weather events, PJM regularly implements a number of "emergency procedures" as defined in its operating manuals and following North American Electric Reliability Corporation (NERC) standards.

Most of these procedures do not constitute a public emergency, but are rather steps PJM takes to prevent an event that would impact electricity service. Some procedures are routine notices to PJM's members to prepare their equipment and facilities to be fully ready to operate, and require no actions from the general public. However, in certain more severe operating circumstances, PJM may issue messages with requests that electricity customers of all types – residential, commercial, industrial, institutional and governmental – conserve their use of electricity as health and safety permit.

This guide provides a high-level overview of the most common and routine emergency procedures PJM regularly implements in advance of hot or cold weather, as well as the most severe procedures PJM might need to implement under only the most extreme circumstances. A complete listing of PJM's emergency procedures is available in PJM's Emergency Procedures tool on PJM.com.

Emergency Procedure Types

Advisory

PJM typically issues an advisory multiple days ahead of an operating day for elevated awareness. Currently, PJM issues only Cold Weather Advisories and Minimum Generation Advisories.

Alert

PJM issues an alert one or more days prior to when it may need to implement emergency procedures. The alert keeps all affected system personnel aware of the forecasted and/or actual operating status of PJM, and allows them time to prepare as needed. Alerts **do not** indicate that emergency actions are currently needed.

While these procedures are generally issued in order of ascending urgency, in certain situations, they may not occur sequentially. They are ultimately issued in whatever order is necessary.

Warning

PJM's emergency warning notifications are issued in real time and indicate that an emergency event is imminent and generally precedes an associated emergency action. Warnings are issued to inform affected system personnel of actual capacity shortages or contingencies that may jeopardize the reliable operation of the grid.

Action

PJM's emergency action notifications are issued in real time and require immediate action from PJM and/or affected system personnel.

Common Weather-Related Messages

Cold Weather Advisory

When PJM expects significantly cold weather to impact all or parts of the PJM footprint, it issues a Cold Weather Advisory to provide a two-to-five-day notice that forecasted temperatures may call for a Cold Weather Alert. This is meant to give generation owners ample time to provide information to PJM about their operating availability, capabilities and limitations to help PJM operators plan for the extreme weather.

Cold Weather Alert

PJM issues a Cold Weather Alert one to two days ahead of when significantly cold weather conditions are expected in all or parts of the region PJM serves. When this alert is issued, PJM communicates with generator owners to tell them to be prepared to call in additional staff to get all generating units running for when electricity use begins to increase in the morning.

Hot Weather Alert

PJM issues a Hot Weather Alert one to two days ahead of forecasted 90-degree weather and/or high humidity in order to prepare transmission and generation personnel and facilities for expected increases in electricity demand, including levels that may require most or all of PJM's generation resources to be used.

Selected Capacity-Related Messages

Consult the Emergency Procedures tool for a complete set of messages.

Maximum Generation Emergency & Load Management Alert

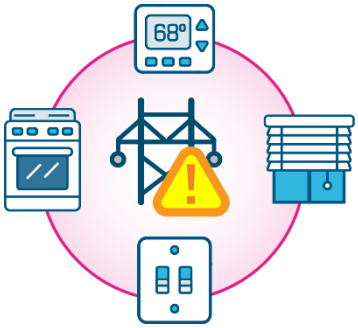
PJM issues a Maximum Generation Alert a day in advance of conditions that may require all generators to operate at their maximum output capability, and that the use of additional emergency procedures may be implemented. This alert is targeted at transmission and generation owners, who then determine if any maintenance or testing on any equipment can be deferred or canceled, in order to maintain the availability of all resources. PJM issues this alert at the same time as a Load Management Alert, which provides advance notice that demand response resources may be used.

PJM issues a NERC EEA Level 1, or EEA-1, in conjunction with a Maximum Generation Alert. NERC defines an EEA-1 as when a grid operator foresees or is experiencing conditions where all available resources are committed to meet electricity load, firm transactions, and reserve commitments, and is concerned about sustaining its required contingency reserves.

PJM's capacity-related emergency procedures and messages are often tied to North American Electric Reliability Corporation (NERC) **Energy Emergency Alerts** (EEAs), which are issued by grid operators for potential and actual capacity and energy shortages. They provide a common terminology for grid operators to use when explaining energy or capacity emergencies.

There are three levels of EEAs (1, 2 & 3), which may be declared in whatever order is needed, and not necessarily sequentially.

Voltage Reduction Alert & Public Call for Electricity Conservation



PJM issues a Voltage Reduction Alert to prepare transmission dispatchers at member organizations to be ready to implement a voltage reduction on short notice. PJM has forecast that its operating reserve will be less than its required synchronized reserve for the upcoming operating day.

Synchronized reserves – generation and Demand Response – are resources, or portions of the resources, that are not in use currently but are synchronized to the system and can be used on short notice. PJM requires a certain amount of reserve each day that is calculated according to the load on that given day.

Subsequent to a Voltage Reduction Alert, PJM issues a public appeal to all electricity customers – residential, commercial, industrial, institutional and governmental – to conserve electricity as health permits. This public appeal is communicated to PJM's utility partners and is published via a news release and social media. It should be issued 12 to 15 hours before the effective period.

A Voltage Reduction Alert and public appeal for electricity conservation falls within a NERC EEA Level 2, or EEA-2. NERC defines an EEA-2 as when a grid operator is no longer able to provide its expected energy requirements, but is still able to maintain minimum contingency reserve requirements. It has also implemented its operating plans to mitigate emergencies, up to but excluding the interruption of electricity service to customers.

Voltage Reduction Action

Power grid operators order voltage reductions on the distribution system in order to reduce the strain on the transmission system during times of heavy electricity usage. Reducing the voltage reduces the amount of power being used by a small amount – PJM estimates it can save an estimated 1,700 to 2,000 MW of demand with this procedure, depending on the season. The effects are not noticeable to most people and equipment.

With a Voltage Reduction Action, PJM continues its public appeal for electricity conservation. A Voltage Reduction Action also falls within a NERC EEA-2.

Rotating Customer Outages (Manual Load Dump)

PJM implements rotating customer outages through a Manual Load Dump Action as a last resort when all other possible means of supplying load have been used. PJM directs system operators to shed a specified amount of power flow to prevent the failure of the entire electric power supply system and to maintain reliability in other interconnected regions.

During this event, the transmission owner or distribution provider may decide to use rotating power outages that will interrupt electric service to some customers for a period of time. When service is restored to them, electric service to a different group of customers will be interrupted. The controlled power interruptions share limited power supplies among all customers.

PJM also continues its public appeal for electricity conservation. A Manual Load Dump Action is PJM's implementation of a NERC EEA Level 3, or EEA-3. NERC defines an EEA-3 as when a grid operator is unable to meet minimum contingency reserve requirements, and has implemented or will imminently implement service interruption to firm load.

Load Shed Directive

A Load Shed Directive results in customer outages but is not related to a lack of electricity supply, and typically occurs at a more localized level to prevent issues from spreading throughout the rest of the PJM system. PJM issues a Load Shed Directive for transmission owners to implement when a transmission facility is exceeding any of its various emergency thermal (how hot a transmission line is allowed to get) or voltage ratings and is in danger of failure.

Additional Procedures

Conservative Operations

There are any number of weather, environmental, physical or cybersecurity events that may require PJM to operate more conservatively. Examples could include a hurricane, an elevated cyber threat or civil unrest that could threaten utility infrastructure. When PJM declares Conservative Operations, system operators have more flexibility to make decisions to maintain reliability.

Geomagnetic Disturbance Warning or Action

A geomagnetic disturbance is caused when the sun emits a stream of charged particles that disturb the earth's magnetic field. The resulting electrical currents flow through power system equipment and can cause equipment damage and a disruption of interconnected system operation. When a geomagnetic disturbance is identified, PJM operates the system with more conservative power limits, in case the unexpected additional power from the geomagnetic disturbance flows on the system.

Post-Contingency Local Load Relief Warning

A Post-Contingency Local Load Relief Warning is the most common emergency procedure that PJM issues. It provides advance notice to a transmission owner that the local transmission system is under stress and more vulnerable to power outages. Actual loss of power is rare.